Draft Proposed Revisions to CTDEP's NOx Regulations

Presented at:
SIPRAC
Hartford, CT
June 8, 2006
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Agenda

- New Concepts
  - Tune-up Program
  - Control Strategy Plans
  - CAIR allowance acquisition program
- Targeted Source Sectors
  - ICI Boilers
  - EGUs

Acronyms

- **BOOS**. Burner out of service
- **CAIR.** Clean Air Interstate Rule
- **DERC**. Discrete Emission Reduction Credits
- **EGU**. Electricity generating unit
- **FGR**. Flue Gas Recirculation
- **HC**. Hydrocarbons
- **ICI boilers**. Industrial commercial and institutional boilers
- **LNB**. Low NOx Burner
- **MMBtu/hr**. Million Btu per hour
- **MW**. Megawatts
- **NOx**. Nitrogen oxides (NO and NO2)
- **O3 NAAQS**. 8-hr ozone national ambient air quality standard is 0.08 ppm
- **OFA**. Over-Fire Air
- **Peaker unit**. EGU that supplies peak load on high electricity demand days
- **PM**. Particulate Matter
- **RACT**. Reasonably available control technology
- **SCR**. Selective Catalytic Reduction
- **SIP**. State implementation plan
- **SNCR**. Selective Non-catalytic reduction

New Concepts

- ICI Boiler Tune-up Program
- Compliance Plans using
  - Control strategy evaluations, and/or
  - CAIR Allowance Acquisition Program
- Require additional CAIR allowances use after January 1, 2012

Benefits of Annual Tune-ups

- Reduce fuel consumption which
  - Reduces Pollution
    - NOx
    - Particulate matter
    - CO2
    - Nitrogen deposition
    - SO2
    - Regional Haze
  - Saves on fuel costs

ICI Boiler Tune-up Program

- ICI boilers 5 MMBtu/hr and greater would participate (with exemptions)
- Perform annual tune-ups:
  - Conduct NOx test pre/post tune-up
  - Conduct combustion efficiency test
  - Submit one-page certification for medium and large units >50 MMBtu/hr
  - Keep certification on-site for small units <50 MMBtu/hr (may develop submission schedule)

Control Strategy Plans

- For Medium and Large Boilers (>50 MMBtu/hr)
- Submit a Control Strategy Plan
  - Evaluate list of control strategies
    - LNB; FGR; NG Reburn; SCR; SNCR; BOOS; OFA, and use of alternative fuels
  - DEP review and approval of control or comply by using allowances at a ratio of 1:1 until December 31, 2011
  - Require additional allowances (greater ratio) after January 1, 2012
- Prioritize DEP review based on time of use, size, emissions

CAIR Allowance Acquisition Program

- Extend existing orders to May 1, 2009
- No more DERC use or generation after May 1, 2009
- Incorporate trading protocol into regulation
- Use CAIR allowances at a ratio of 1:1 to meet emission limits until December 31, 2011
- Require additional allowances (greater ratio) after January 1, 2012

Targeted Source Sectors

- Part I
  - ICI Boilers – large number of sources
- Part II
  - EGUs – peak demand days & most reasonable to control
  - Demand Response Engines – address issue created by DPUC grant program
  - Stationary Source Turbines – first step in addressing peak emissions on peak demand days
- Asphalt Production Plants (currently under review)
  - Typically have avoided NOx regulations and operate on peak ozone days

Part I: ICI Boilers

- Steam generating units that generate steam to supply power and/or heat to industrial, commercial, or institutional operations.
- Prioritize by boiler size to obtain reasonably achievable NOx reductions
  - Small: 5-50 MMBtu/hr
  - Medium: 50-250 MMBtu/hr
  - Large: >250 MMBtu/hr

ICI Boilers In Connecticut

Boiler Heat Input (MMBtu/Hr)	Number of Units	Actual NOx (TPY)	Actual HC (TPY)	Actual SOx (TPY)	Actual PM (TPY)
5-49.9	2010	1886	58.2	2975	201
50-99.9	65	520	29.8	646	75.9
100-250	35	790	15.1	970	91.1
>250	3	397	5.4	235	47.4
Total	2,113	3593	108.5	4826	415.4

ICI Boiler Roadmap

- Perform Annual Tune-ups
- Meet emission Limit
- Compliance Plans
  - Submit certification of compliance
  - Control strategy evaluations
  - Acquire CAIR allowances
- Require additional CAIR allowances (greater ratio) after January 1, 2012

ICI Boiler Off Ramps

- Don't have to do annual Boiler Tune-ups if
  - <5 MMBtu/hr
  - Achieve required energy efficiency rating
  - Operate continuous emission monitors
- Don't have to meet emission limits if
  - <5 MMBtu/hr
  - 5 to 50 MMBtu/hr, not at a major source and don't operate during the summer
- Compliance Plans
  - DEP review of Control Strategy Plans prioritized based on time of use and size(1/3 per year)
  - Use CAIR Allowance Acquisition protocol until Control Strategy Plan is due

Small ICI Boilers

- Size: 5-50 MMBtu/hr
- New concepts
  - Participate in ICI Boiler Tune-up Program if
    - Can't meet energy efficiency benchmark or
    - Does not have CEM
  - For Units operating in summer at a major source
    - Meet limits
    - Submit compliance plan includes option to comply using CAIR allowances at a ratio of 1:1 until December 31, 2011
    - Require additional allowances (greater ratio) after January 1, 2012

Medium ICI Boilers

- Size: 50-250 MMBtu/hr
- New concepts
  - Participate in ICI Boiler Tune-up Program if can't meet energy efficiency benchmark or does not have CEM
  - Meet more stringent emission limit
  - Submit compliance plan, includes option to comply using CAIR allowances at a ratio of 1:1 until December 31, 2011
  - Require additional allowances (greater ratio) after January 1, 2012

Large ICI Boilers

- Size: >250 MMBtu/hr
- New concepts
  - CAIR program/sunset NOx Budget Program
  - Participate in ICI Boiler Tune-up Program if do not have CEM
  - Meet more stringent emission limits
  - Submit compliance plan, includes option to comply using CAIR allowances at a ratio of 1:1 until December 31, 2011
  - Require additional allowances (greater ratio) after January 1, 2012

2001 OTC Boiler NOx limits

Unit Size (MMBtu/hr)	Gas Fired (lb/MMBtu)	Residual Oil Fired (lb/MMBtu)	Other-Oil Fired (lb/MMBtu)	Coal Fired (lb/MMBtu)
Existing 22a-174-22 Other Boiler (all sizes)	**0.20**	**0.25**	**0.20**	**0.38**
5 to 50	Tune-up (0.05)	Tune-up (0.20)	Tune-up (0.08)	Tune-up
50 to 100	0.10 (0.05)	0.30 (0.20)	0.30 (0.08)	0.30 (0.38)
100 to 250	0.10 (0.10)	0.20 (0.20)	0.20 (0.20)	0.20 (0.11-0.14)
>250 Before December 31, 2011 After December 31, 2011	0.17 CAIR + CAIR +	0.17 CAIR + CAIR +	0.17 CAIR + CAIR +	0.17 CAIR + CAIR +

(*) proposed 2006 OTC Limit

Part II: EGU Categories

- Demand Response Engines
- Stationary Source Turbines
- Large Utility Boilers
  - Cyclone furnaces
  - Fast-response double furnace
  - Fluidized bed combustors

Engines Being Used in the Demand Response Program

- Remove emergency exemption in regulation
- Meet 2001 OTC model rule emission limits
  - On oil – 2.3 gm/bhp-hr (existing 8 gm/bhp-hr)
  - On gas – 1.5 gm/bhp-hr (existing 2.5 gm/bhp-hr)
- Existing emergency engines entering into DR program will be subject to 22a-174-42 limits
- Use CAIR allowances at a ratio of 7:1 until December 31, 2011
- Require additional allowances (greater ratio) after January 1, 2012

Stationary Source Turbines

- First step in addressing peaking units
- Meet more stringent emission limits than the 2001 OTC model rule
  - On oil – 42 ppm (existing limit 75 ppm)
  - On gas – 25 ppm (existing limit 55ppm)
- Use CAIR allowances for peaker units at a ratio of 7:1 until December 31, 2011
- Require additional allowances (greater ratio) after January 1, 2012

Utility Boilers

- CAIR
  - Seasonal Program
  - NOx CAIR Allowances for > 15 MW units
- RACT
  - Daily Limit (24-hr average)
  - Use NOx CAIR allowances for excess emissions until December 31, 2011
  - Require additional allowances (greater ratio) after January 1, 2012

2001 OTC NOx limits For Cyclone Boilers

Unit Size (MMBtu/hr)	Gas Fired (lb/MMBtu)	Residual Oil Fired (lb/MMBtu)	Other-Oil Fired (lb/MMBtu)	Coal Fired (lb/MMBtu)
Existing 22a-174-22 Other Boiler (all sizes)	**0.43**	**0.43**	**0.43**	**0.43**
5 to 50	Tune-up	Tune-up	Tune-up	Tune-up
50 to 100	0.10	0.30	0.30	0.30
100 to 250	0.10	0.20	0.20	0.20
>250	0.17	0.17	0.17	0.17

2001 OTC NOx limits For Fast-Response Double-Furnace Naval Boilers

Unit Size (MMBtu/hr)	Gas Fired (lb/MMBtu)	Residual Oil Fired (lb/MMBtu)	Other-Oil Fired (lb/MMBtu)	Coal Fired (lb/MMBtu)
Existing 22a-174-22 Other Boiler (all sizes)	**0.20**	**0.30**	**0.30**	**0.30**
5 to 50	Tune-up	Tune-up	Tune-up	Tune-up
50 to 100	0.10	0.30	0.30	0.30
100 to 250	0.10	0.20	0.20	0.20
>250	0.17	0.17	0.17	0.17

2001 OTC NOx limits For Fluidized Bed Combustors

Unit Size (MMBtu/hr)	**Coal Fired (lb/MMBtu)**
Existing 22a-174-22 Other Boiler (all sizes)	**0.29**
5 to 50	Tune-up
50 to 100	0.30
100 to 250	0.20
>250	0.17

Summary

- Align/tighten emission limits w/ OTC
- Institute annual boiler tune-up program
- Institute compliance plan requirements
  - require 1/3 of sources to submit control strategy plans per year
  - use CAIR allowance acquisition protocol until control strategy plans are approved
- Require additional allowances (greater ratio) after January 1, 2012